WHAT IS CLAIMED IS:

1. An integrated circuit for controlling a power supply circuit which delivers power to a load circuit that includes a fluorescent lamp, comprising:

ballast control and drive circuitry that provides drive signals to the power supply circuit, that receives sense signals indicating operating conditions of at least one of the power supply circuit and the load circuit, and that responds to the sense signals by modifying the drive signals; and including

adaptive zero-voltage-switching and minimum-current-switching (ZVMCS) circuitry, wherein said ZVMCS circuitry senses an output of said power supply circuit and in response thereto, controls said drive circuitry to maintain said power supply circuit under ZVMCS conditions.

2. The integrated circuit of claim 1, in which the power supply circuit includes a half-bridge circuit with low and high side power devices, the drive signals including low side drive signals to control the low side power device and high side drive signals to control the high side power device; the ballast control and drive circuitry including a low side drive output for providing the low side drive signals to the low side power device and a high side drive output for providing the high side drive signals to the high side power device.

3. The integrated circuit of claim 2, wherein said ZVMCS circuit senses an output voltage of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controls said drive signals so as to maintain said output voltage near or at zero at said switching time.

4. The integrated circuit of claim 2, wherein said ZVMCS circuit senses an output current of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controls said drive signals so as to maintain said output current near or at zero at said switching time.

5. The integrated circuit of claim 1, wherein said load circuit has a resonant frequency;

said drive circuitry controls said power supply circuit to supply power at an operating frequency; and

said ZVMCS circuitry controls said drive circuitry to maintain said operating frequency at or near said resonant frequency.

6. The integrated circuit of claim 5, wherein said operating frequency is maintained above but near said resonant frequency.

7. The integrated circuit of claim 5, wherein

the power supply circuit includes a half-bridge circuit with low and high side power devices, the drive signals including low side drive signals to control the low side power device and high side drive signals to control the high side power device; the ballast control and drive circuitry including a low side drive output for providing the low side drive signals to the low side power device and a high side drive output for providing the high side drive signals to the high side power device; and

said ZVMCS circuit senses an output voltage of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controls said drive signals so as to maintain said output voltage near or at zero at said switching time.

8. The integrated circuit of claim 7, wherein said ZVMCS circuit senses an output current of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controls said drive signals so as to maintain said output current near or at zero at said switching time.

9. The integrated circuit of claim 5, wherein said operating frequency of said drive circuitry is determined by a voltage-controlled oscillator (VCO), and said ZVMCS circuitry determines a control voltage supplied to said VCO.

10. The integrated circuit of claim 9, wherein said ZVMCS circuitry increases said control voltage in order to increase said operating frequency.

11. The integrated circuit of claim 10, wherein said control voltage is supplied by an input capacitor of said VCO, and said ZVMCS circuitry charges said capacitor to a higher voltage in order to increase said operating frequency.

12. The integrated circuit of claim 11, wherein said ZVMCS circuitry charges said capacitor by turning on a switching device in order to supply a charging current to said capacitor.

13. An integrated circuit for controlling a power supply which delivers power to a load circuit that includes a fluorescent lamp, comprising:

ballast control and drive circuitry that provides drive signals to the power supply circuit, that receives sense signals indicating operating conditions of at least one of the power supply circuit and the load circuit, and that responds to the sense signals by modifying the drive signals;

the ballast control and drive circuitry further having a set of modes in any of which it can operate, the ballast control and drive circuitry making transitions between the modes in response to the sense signals; and including

adaptive zero-voltage-switching and minimum-current-switching (ZVMCS) circuitry, wherein said ZVMCS circuitry senses an output of said power supply circuit and in response thereto, controls said drive circuitry to maintain said power supply circuit under ZVMCS conditions.

14. The integrated circuit of claim 13, in which the modes include an under-voltage lockout mode, a frequency sweep mode, an adaptive mode and a fault mode.

15. The integrated circuit of claim 13, wherein said integrated circuit has eight pins;

four pins being connected to said drive circuitry;

two pins being connected to a power supply and a return; and

two pins being used for setting an operating frequency of said drive circuitry.

16. The integrated circuit of claim 15, wherein said operating frequency of said drive circuitry is determined by a voltage-controlled oscillator (VCO), and a control voltage is supplied to said VCO by an input capacitor connected to one of said two pins for setting an operating frequency.

17. The integrated circuit claim of 16, wherein the other one of said two pins is used to set a minimum frequency of said VCO.

18. The integrated circuit of claim 16, wherein said ZVMCS circuitry sets said control voltage by controlling a charge on said input capacitor of said VCO.

19. A method for controlling a power supply circuit which delivers power to a load circuit that includes a fluorescent lamp, comprising:

providing drive signals to the power supply circuit, receiving sense signals indicating operating conditions of at least one of the power supply circuit and the load circuit, responding to the sense signals by modifying the drive signals; and

adaptively maintaining zero-voltage-switching and minimum-current-switching (ZVMCS), by sensing an output of said power supply circuit and in response thereto, controlling said drive signals to maintain said power supply circuit under ZVMCS conditions.

20. The method of claim 19, in which the power supply circuit includes a half-bridge circuit with low and high side power devices, the drive signals including low side drive signals to control the low side power device and high side drive signals to control the high side power device; wherein said ZVMCS conditions are maintained by sensing an output voltage of said half-bridge circuit between said high side and low side

power devices at a switching time of one of said power devices, and controlling said drive signals so as to maintain said output voltage near or at zero at said switching time.

21. The method of claim 20, wherein said ZVMCS conditions are maintained by sensing an output current of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controlling said drive signals so as to maintain said output current near or at zero at said switching time.

22. The method of claim 19, wherein said load circuit has a resonant frequency;

said power supply circuit supplies power at an operating frequency; and

said operating frequency is maintained at or near said resonant frequency.

23. The method of claim 22, wherein said operating frequency is maintained above but near said resonant frequency.

24. The method of claim 22, in which the power supply circuit includes a half-bridge circuit with low and high side power devices, the drive signals including low side drive signals to control the low side power device and high side drive signals to control the high side power device; wherein said ZVMCS conditions are maintained by sensing an output voltage of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controlling said drive signals so as to maintain said output voltage near or at zero at said switching time.

25. The method of claim 24, wherein said ZVMCS conditions are maintained by sensing an output current of said half-bridge circuit between said high side and low side power devices at a switching time of one of said power devices, and controlling said drive signals so as to maintain said output current near or at zero at said switching time.

26. The method of claim 22, wherein said operating frequency is determined by a voltage-controlled oscillator (VCO), and comprising the step of controlling a control voltage supplied to said VCO.

27. The method of claim 26, wherein said control voltage is supplied by an input capacitor of said VCO, and comprising the step of controlling a charge on said capacitor in order to set said operating frequency.